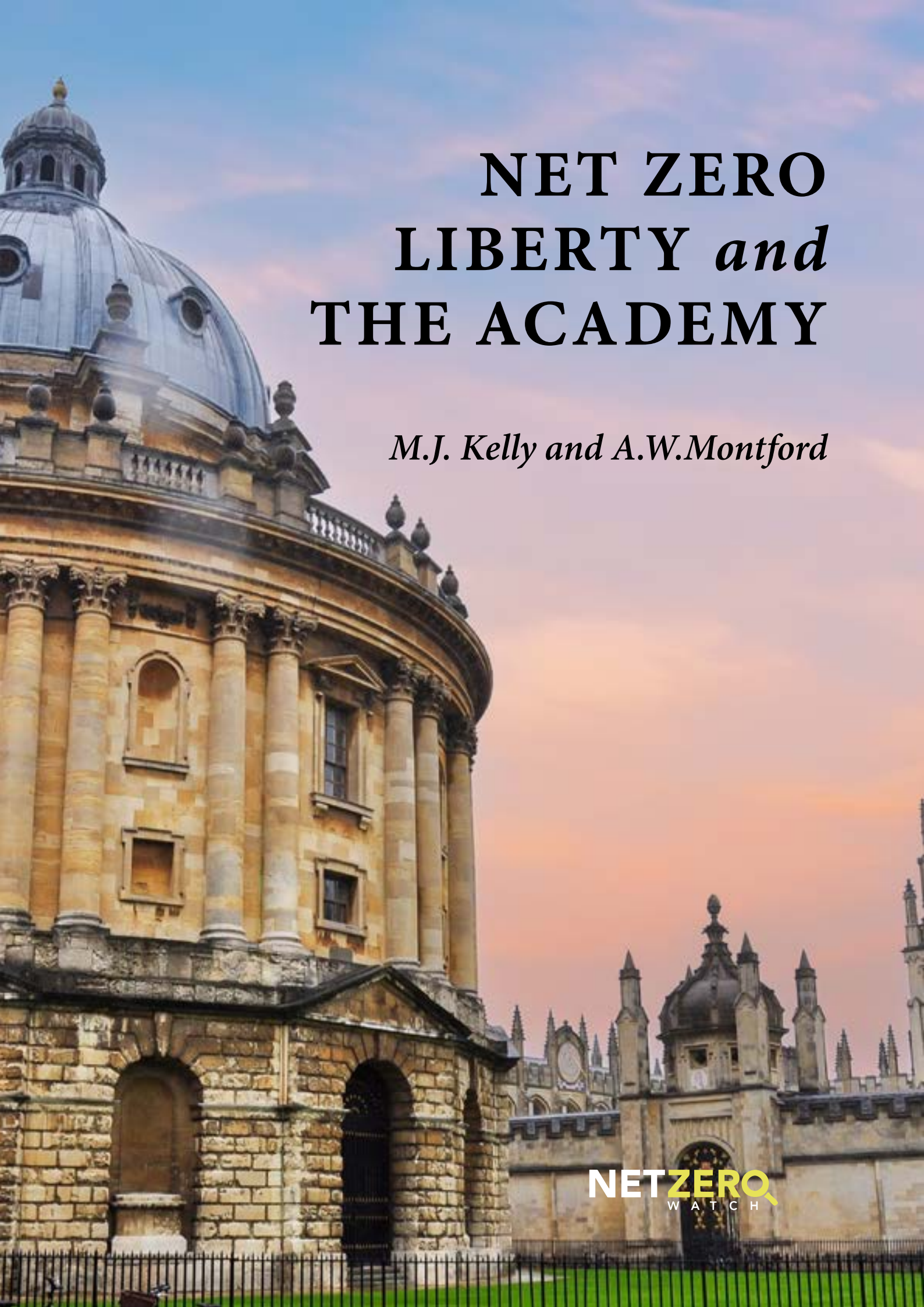
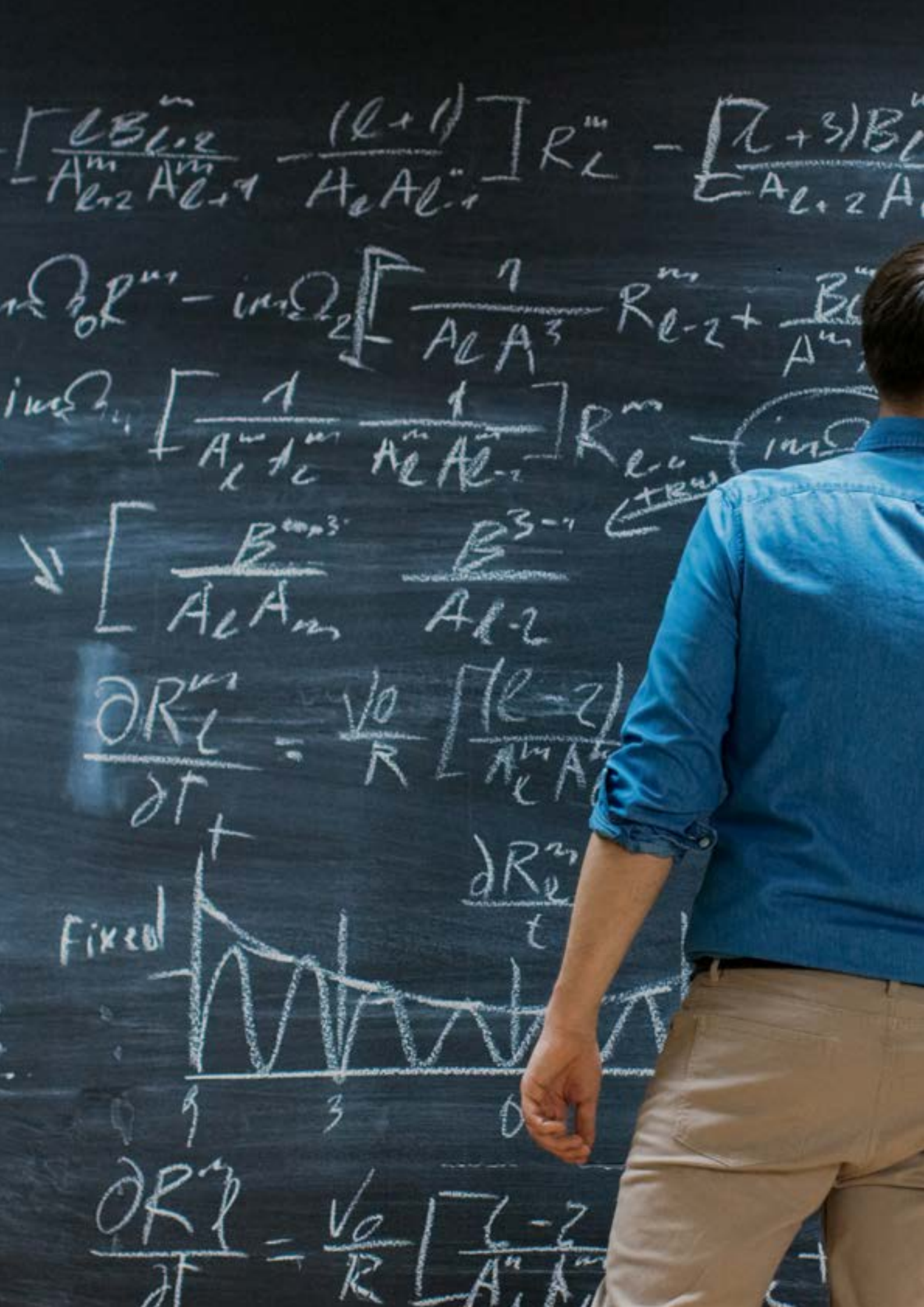


NET ZERO LIBERTY *and* THE ACADEMY

M.J. Kelly and A.W.Montford

NETZERO WATCH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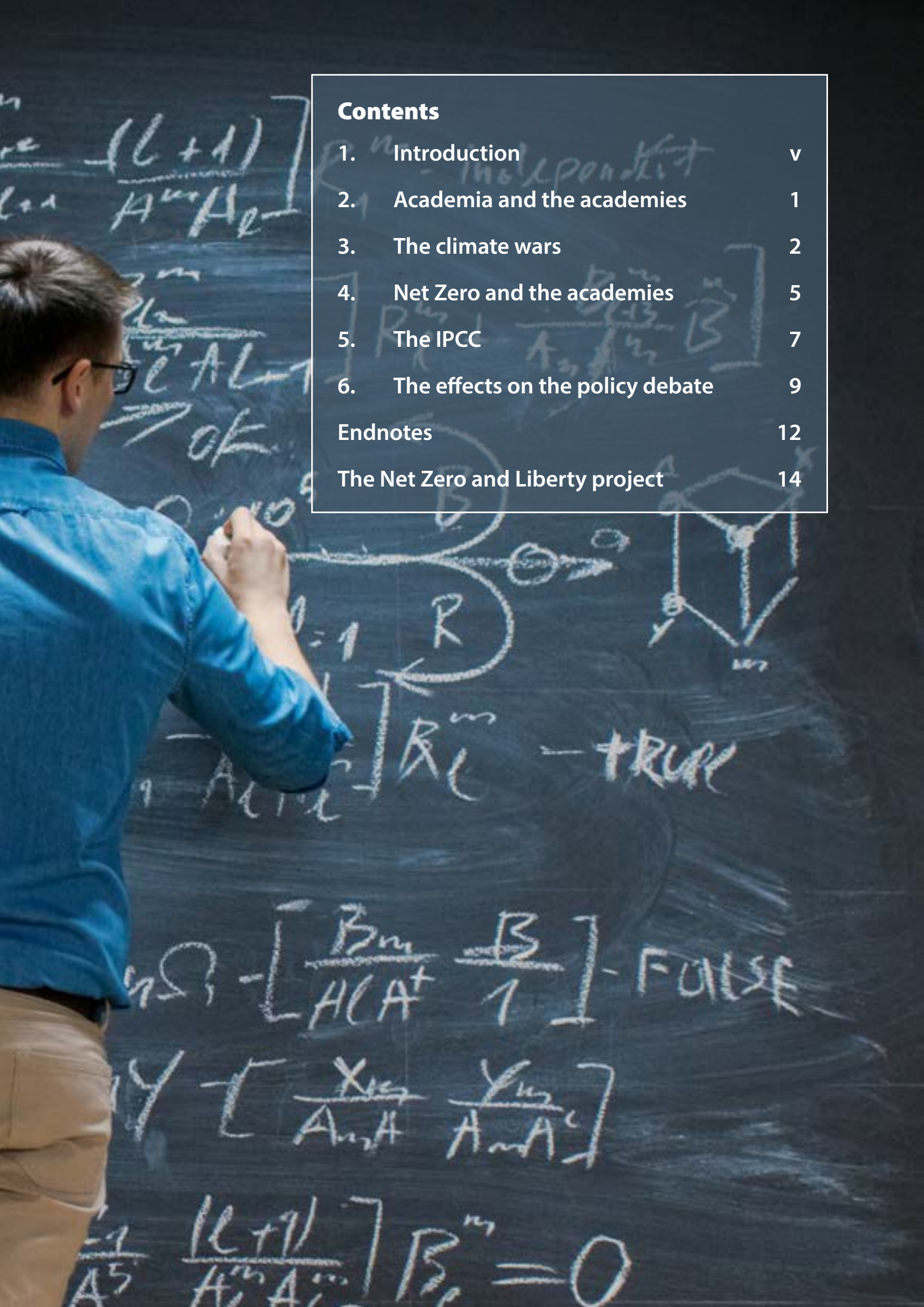

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1. Introduction

Public life has become infested with an astonishing array of new ways of thinking. Concepts such as 'political correctness', 'social justice', 'safe spaces', and 'trigger warnings', now commonplace in higher education institutions, were unheard of twenty years ago. Many of them encompass themes of intellectual 'no-go areas' – questions that must not be asked, views that must not be held. Their proponents – mostly from the left of centre –seem to feel that there is much that cannot be debated or even discussed today without risking upsetting someone, and that is reason enough to ban the topics in question.

The arrival of these ideologies, with so many questions that cannot be asked, and answers that cannot be questioned, has been hugely damaging to academic life. In this paper, we consider how inquiry in just one field – climate and decarbonisation – has been chilled to the point at which dissent has become impossible, and to look at the knock-on effects of the resultant groupthink on the scientific institutions and the policy world.

Climate change is an exceedingly complicated science – too much so for physicists and chemists to tackle alone. There are too many unknowns among the basic assumptions: in mathematical terms, the dynamics of the atmosphere (weather in the short term, averaging to climate in the longer term) is multi-factorial, closely coupled, and highly nonlinear (doubling the effect of some primary driver of the climate does not double the reaction of the atmosphere) and chaotic.

As a result – at least in the early days – climate scientists were modest in their claims about what they knew, and generous in their assessments of what they knew they didn't. And even today, many sensible scientists avoid the subject as being impenetrable with the tools that are available, which, to a large extent, means computer simulations. These are highly complex, and enormous effort is put into building and testing them, but they are of questionable relevance to the real world since they fail to reproduce key features of the climate, such as the global temperature, or rainfall patterns. These failings are typically masked by 'tuning' them (i.e. tweaking adjustable parameters) so that they reproduce the recent past.

However, this process is somewhat arbitrary, and so the outcomes can be very different: profiles of future temperature changes may vary by a factor of two or more from one model to the next. Even more worryingly, for the last 30 years all models have run too hot. Nor has the spread of results narrowed, or the average rate of heating reduced to something closer to what is seen in the empirical evidence.

This lack of progress is very worrying. In the branches of scientific modelling with which we are familiar, for example the electronic properties of solids, such a sustained error would be a source of despair. Imagine a programme running an airliner's autopilot with such a persistent and variable error, with a journey to New York ending over, say, Iceland. There would be uproar.

The unavoidable conclusion is that climate models are not working as predictors of what is coming in the short, medium, or longer terms.

Nevertheless, the climate science community has captured the attention of policymakers and legislators worldwide, and major policy measures have been adopted as a result. This paper will look at what happened.

2. Academia and the academies

In the popular conception, universities over the last thousand years have been seen as places of deep, original and disinterested thinking, challenging the status quo in the pursuit of a better future. For most of that time, they were ivory towers, separate from worldly concerns, as exemplified by Oxford and Cambridge. Both were small towns, distant from major political and commercial centres, operating initially as monastic foundations, but then gradually becoming more secular, a process that has not been completed today.

After Roger Bacon (1561–1626) popularised the notions of empiricism and the study of nature, a scholastic revolution took place across Europe, developing into what we now call science and engineering. In the new approach, observational studies and experiments were undertaken, with knowledge deduced from the collected data rather than simply accepting as truth the words of scholars of previous centuries. Research became one of the key functions of a university.

John Henry Newman's collection of essays *The Idea of a University*, published in 1852,[1] was the first major work on the purpose of higher education as we know it today. Newman set out its research function, describing a self-governing community of disinterested scholars engaged in the single-minded pursuit of truth. Alongside this was the second function – the education of the young, and the turning out of a highly educated elite. Newman gave an impassioned argument for the teaching, alongside other subjects, of theology, so that the whole person – moral and intellectual – could be developed.

Academic freedom had been a key tool in the search for truth since the beginning. University researchers were to be unconstrained as to the objects of their investigations, and collegiate discussion, often vigorous and disciplined, on any topic of interest, was to be encouraged and even revered as a path to new knowledge. This practice of free thought and open debate only strengthened once the Baconian idea of science – to observe, explain and exploit new phenomena – took hold.

An early consideration was the development of what is now called 'tenure'. Freedom of thought was entrenched through the idea that a scholar could not be summarily dismissed for his (they were all men until recently) unorthodox or even heretical views.

The universities took care to protect the collegiate spirit. At first, that meant excluding from the UK universities all but the Church of England faithful, but in the 19th and 20th centuries, as barriers to the academy fell, the focus shifted to excluding nefarious outside influences that might seek to distort the debates within. Memoirs of former university leaders frequently allude to their constant struggles to maintain academic freedom from such influences,[2][3][4] such as national socialism in the 1930s. All such extreme ideologies, seeking to demonise opponents and to silence dissent, are anathema to the notion of free, open and dispassionate debate, or indeed to the very notion of a university.

However, over the years the role of universities changed. With the Industrial Revolution in England in the 18th century, and through the course of the 19th century, particularly in Germany, the sciences became firmly established in the sector. The truths and insights that university researchers uncovered turned out to be hugely beneficial to wider economies. For example, they began to establish the principles behind the chemistry of synthetic dyes, enabling systematic advances to be made, a step-change from the trial-and-error approaches that had until then been used in industrial laboratories.

Universities also turned out to be vital to national militaries, and their public role changed significantly after World War II, which was clearly recognised as a war of technologies, with advances in radar and communications, and ultimately the atomic bombs that brought the war to an end. Many scientists came out of academia to help in the war effort, and at its end they took surplus military hardware back with

them. The result was a range of scientific breakthroughs, from the discovery and refining of new materials and technologies, exemplified by semiconductor electronics, to whole new areas of research, such as radio astronomy.

After this long period of change, universities are now seen as drivers of economic growth,[5] both through the exploitation of new research findings and as key sources of highly skilled workers. It is noticeable that many of the fastest-growing economic centres in the world are in the shadows of great universities, with entrepreneurs returning to the towns where they were educated, recruiting staff for their growing businesses.

However, the ways in which tertiary education is delivered and consumed has changed too. Academics engaged in preparing young people for future lives in finance or technology will behave differently to those preparing the young for lives engaged in a disinterested search for truth. Moreover, whereas even 50 years ago academics taught with the idea of inspiring the next generation of academics, many of today's students want to know how they can exploit their new knowledge as future captains of industry. And now that as many as half of the young attend, universities have in many cases become – at best – places to seek skills for future employment, and at worst merely a way of putting off the day of joining the jobs market.

Over the last 50 years, academics have tended to be left wing, especially in the humanities, and have often been hostile to those with conservative views. The impact of the vast influx of students and staff with socialist and eco-socialist views has been significant. They have brought with them all the bizarre tropes of socialist activists – trigger warnings, no platforming and all the rest of it – together with a cold-hearted willingness to cancel anyone who holds views of which they disapprove. When trigger warnings are given before discussing anything that might hurt anyone's feelings, there are few limits on the subjects that get sidelined. The chilling effect on free speech in the academy has been profound.

Unsurprisingly, Newman's focus on truth seeking seems to have been lost along the way. Indeed, even the notion of objective truth, so central to his ideas, has been all but abandoned, replaced by subjectivity, and the absurd idea that all views are equally valid.

3. The climate wars

Modern democracies are built on the four freedoms: of speech and expression, of religion, and from want or from fear. These principles were laid out in Franklin D. Roosevelt's 1941 State of the Union Address. In our own times, these freedoms have to be fought for, rather than taken for granted. In some places – the Ukraine, the Middle East and north-east Africa – they are all but absent, and concerns about the evolution of the climate over many decades, and its possible effects on humanity, are buried under more immediate concerns.

People over the age of about 40 can remember growing up under the constant possibility of someone, somewhere, pressing a button to initiate a devastating nuclear war. This fear put most other concerns in the shade. With the end of the Cold War and the collapse of the Soviet Union, those worries receded, and for a short period people in the West thought that a new age of peace and tranquillity was dawning. For a human species in which evolution has deeply embedded a fight-or-flight mentality, the prospect of the four freedoms becoming global was itself deeply unsettling. Mankind needed a new enemy. Into this vacuum came the environmental movement, with mankind itself the enemy, ruining every day the pristine purity of planet Earth, or so it was alleged. Climate change became the frontline of the new conflict.

Among the prominent superstitions that have found their way into the university system are environmentalism and, more specifically, climate catastrophism and Net Zero.

Almost all students arriving at universities have already been thoroughly indoctrinated in school, where the idea of exclusively man-made climate change is taught as gospel. The young carry this misconception with them when they move up to tertiary education, and, on the rare occasions they encounter a dissenting view there, they experience genuine shock that they might have not been told the full story.

As with all the other left-wing superstitions – gender activism, social justice warfare and the like – green activists have brought with them a cult-like approach to academic discourse. All the tactics of the social justice warrior are deployed, from demonisation, to disruption, defunding, ostracism and cancellation.

The American researcher Roger Pielke Jr has described how the University of Colorado was diverted from its true purpose to environmental activism.[6] It started with the School of Environmental Sciences:

> *[From 2017–23] the faculty assembly issued eight statements and resolutions calling for climate advocacy on campus – including encouraging students to engage in nonviolent 'confrontations' and joining with student activists and external NGOs to declare a 'climate emergency'.*

This culminated in a resolution that the whole university switch to environmental work:

> *BE IT RESOLVED that University of Colorado Boulder faculty endorse prioritizing climate change and sustainability actions to be the central focus of our campus-wide initiatives…*

…and that climate advocacy be taught in all departments.

There is no longer any debate about climate change or Net Zero in the universities; 'The science is settled', they say, despite the fact that it is axiomatic of the scientific method that it is never settled, and that all insights are provisional and can be struck down or overtaken by the results of a single experiment that has been replicated.

One looks in vain for a genuine, two-sided debate on the causes, magnitude and likely future of climate change, in the way in which one can still debate, say, the existence and relevance (or otherwise) of dark matter. Similarly, discussion of the wisdom of the Net Zero target is almost entirely suppressed. As a particularly shameful example, take the Oxford Union's 2024 debate 'This House Has No Faith in Net Zero Before 2035',[7] which featured no fewer than eight speakers, all of whom were in favour of the target.

Even those that say that they do allow discussion certainly do nothing to actively encourage it, and indeed may even take steps to sabotage it. When one of us (AM) was invited to a seminar on climate change and Net Zero at Sheffield University, it turned into a non-event after university officials sent out an email the night before reporting, falsely, that the organisers had cancelled it. 'A misunderstanding' was alleged to have taken place. No doubt the presence of several prominent sceptics among the invitees played a part.

For informed discussion and challenge to the narrative of doom, it is necessary to look to informed dissidents. But this community, mostly associated with think tanks and pressure groups, is by and large excluded from the mainstream university discourse, from academic publishing houses and presses, and from media. They have to self-publish articles, reports and papers, distributing them online or privately among themselves. These efforts have met with little success until recently.

The climate faithful in academia are willing to go much further though. Dissenters – those who question any of the popular interpretations of the data or the plausibility of the climate models – are subject to demonisation and ostracism. They are often lazily described as 'climate deniers', so then they can be summarily dismissed without any need for a debate. In our experience, when there is no scientific comeback to arguments we have raised, we are accused of being shills of Big Oil, incompetent, and not to be read, let alone trusted. One only has to follow the comments attached to articles in the online

mainstream media to gauge the tenor of the debate.

Another approach used to silence dissenting views is to prevent their being published in the peer-reviewed literature. Since, for most journals, the reviewers' identities are kept secret, it is possible for rejections to be made on the flimsiest of grounds.

Demetris Koutsoyiannis, a leading hydrologist, who has made important contributions to the understanding of the natural variability of the climate, has tried to expose what is happening.[8] As he has explained:

> *Publishing papers that challenge conventional wisdom is not easy. I struggled to publish each one of [my] papers that contradict the established climate narrative. I still struggle to publish others which are being reviewed or have been rejected. The attacks may continue after publication of published papers, aiming to force publishers to retract published papers.*

Further examples of this effect were seen in the infamous Climategate affair,[9] in which emails from a group of the world's leading climatologists found their way onto the web, thus exposing what was going on in the background. For example, Phil Jones, the University of East Anglia scientist who was one of those at the centre of the affair, was seen to say of some sceptical publications:

> *'I can't see either of these papers being in the next IPCC report. Kevin [Trenberth] and I will keep them out somehow - even if we have to redefine what the peer-review literature is!'*

The same group of scientists was seen to be threatening journal editors who wouldn't exclude sceptical views from their pages: Penn State University's Michael Mann said of a publication that had stepped out of line:

> *'…we should encourage our colleagues in the climate research community to no longer submit to, or cite papers in, this journal.'*

It is small wonder that dissenters find it so hard to publish their findings. This is no small matter, because in most of the western world, regular publication is a prerequisite for a sustained academic career.

The pressures and threats have driven many dissenters out of academia entirely. The defenders of the climate status quo have found that with sufficient effort they can overcome even the protections of academic tenure, which is supposed to protect academic freedom.

Roger Pielke Jr, the researcher we met on page 3, is an expert in extreme weather, and in particular on hurricane damage. Although not a climate sceptic, he has been rigorous in reporting honestly what his data show, namely that there is no trend in damage once rising populations and wealth are corrected for. However, since this position went against the mainstream narrative, he found himself attacked as a 'denier' and ultimately he was driven out of his university entirely, despite having tenure and a stellar research career.

This result was achieved by means of steady political and academic pressure.[10] First, a US congressman called Raul Grijalva asked Pielke's university to investigate him, alleging that he had been taking money from Exxon. Funding for the science policy centre he ran was cut. Correctly reading the room, Pielke changed specialism, setting up a new centre for sports governance. However, as the university became increasingly politicised and focused on environmentalism, his past as someone who might ask awkward questions about the climate appeared to catch up with him. He was transferred to the School of Environmental Studies, where he was housed in a windowless basement room that had previously done service as a storeroom. Next, his sports governance unit was defunded, and all the courses offered were shut down. Then, his makeshift office started to be filled with boxes and filing cabinets, essentially making the space unusable. After that, the school authorities launched an investigation, bizarrely accusing him of having won a grant in violation of university procedures. Perhaps unsurprisingly, a guilty verdict was decided upon, although a subsequent appeal found that there was no case to

answer and that Pielke's due process rights had probably been violated. Another investigation was launched. It went on and on, until eventually, in 2024, he took early retirement, becoming effectively a freelance scholar.

Pielke Jr is by no means unique in having been driven out of the academy. Another prominent example is Judith Curry, a senior climatologist who resigned from Georgia Institute of Technology after being – as she put it – 'pilloried' for engaging with sceptics:

> *A deciding factor was that I no longer know what to say to students and postdocs regarding how to navigate the CRAZINESS in the field of climate science. Research and other professional activities are professionally rewarded only if they are channeled in certain directions approved by a politicized academic establishment — funding, ease of getting your papers published, getting hired in prestigious positions, appointments to prestigious committees and boards, professional recognition, etc.*

Unsurprisingly most sceptics either leave the academy or remain silent. There are only a handful of exceptions, whose scientific stature makes them effectively untouchable. For example, there is Richard Lindzen, a fellow of the National Academy of Sciences as well as being a pioneer of the field of climatology, and the Nobel laureates (the late) Ivar Giaever and John Clauser, and former senior US government scientific advisers Steven Koonin and Richard A. Muller. All have managed to continue to criticise climate science as a whole, or at least specific findings.

However, even very senior scientists can find themselves subjected to intolerable pressure. When Lennart Bengtsson, the former director the European Centre for Medium-Range Weather Forecasts, indicated that he might be about to ask some pointed questions about the credibility of climate science, he was contacted by colleagues who suggested that they would end all collaboration with him unless he changed course. The threats were successful. Bengtsson compared his treatment to McCarthyism.[11]

As a result, many scientists have chosen to remain silent until they retire. One prominent example was another pioneering climatologist, Joanna Simpson, who ended her career as NASA's lead weather researcher, but who still felt unable to mention her (rather mild and entirely correct) view that the case for climate concern was based almost entirely on the output of climate models rather than empirical data. As she put it:

> *Since I am no longer affiliated with any organization nor receive any funding, I can speak quite frankly…There is no doubt that atmospheric greenhouse gases are rising rapidly and little doubt that some warming and bad ecological events are occurring. However, the main basis of the claim that man's release of greenhouse gases is the cause of the warming is based almost entirely upon climate models. We all know the frailty of models concerning the air-surface system.*[12]

4. Net Zero and the academies

The impact of environmentalism on the academies –the Royal Society of London, the Royal Academy of Engineering and so on, together with their equivalents in the USA, Europe, Japan and Australasia – has, shockingly, been even worse than on the universities.

A classic example was the fate of a potential two-day discussion meeting at the Royal Society of London, entitled *The Downsides of Decarbonising an Economy*. The proposal for the meeting was submitted by a group of fellows, including one of the authors of this paper (MJK), in 2014. However, for over two years there was neither a 'yes' nor a 'no' response from the officers responsible, who appeared to be machinating to avoid the meeting going ahead. In the end, the ruse they employed was to replace the proposers. A new team led by a climate scientist quickly repurposed the meeting into something less uncomfortable for the activists, as could be discerned from the new title they gave thje meeting: *Technologies to Decarbonise the Economy*.

Although one of the new organising committee argued successfully that MJK should be allowed to contribute to the meeting, key people left the room as he got up to speak. Moreover, nothing of what he said was mentioned in the summary report of the meeting, which itself took over a year to come out. Eventually, a new President of the Royal Society, Venki Ramakhrishnan, apologised about how the proposal had been mishandled, although this regret did not extend to offering an opportunity to reinstate it.

Nearly ten years later, in 2023, MJK proposed another Royal Society meeting to discuss the engineering and economic problems associated with achieving Net Zero by 2050. Once again, this was turned down, with the society's officials declaring it 'one-sided, and not therefore a debate as one would expect'. They also suggested that the proposal's citation of four recent books on the subject, rather than papers in referred journals, was a fatal flaw: their insinuation was that four research papers from the peer-reviewed literature should have been cited instead, so as to emphasise the currency of the debate. The fact that papers critical of climate science or the Net Zero response are kept out of refereed journals (see above) did not appear to have occured to them. Remarkably, at no point in the rejection was the actual subject matter of the meeting even mentioned. It is doubtful that this would have happened for a meeting (say) on quantum computing.

In recent months, the Royal Society and the Royal Academy of Engineering have again been asked to investigate the emerging evidence that the Net Zero 2050 project is an unobtainable pipedream, because we do not have any of the human, financial and materials resources to actually deliver the project, or the public buy-in for the scale of what is needed.[13]

While the Royal Society officers have said 'now is not the time', although without offering up any further explanation of when the 'right time' might be, the Royal Academy has at least gone through the motions of taking up the issue. There has been at least some limited internal discussion. However, deep and serious engagement with the topic remains elusive.

These problems are widespread in academies across the western world. MJK resigned from the Royal Society of New Zealand after it published a deeply substandard report – missing any hard data, for example – on transitioning New Zealand to a low-carbon economy. Despite providing the relevant data and showing that, after excluding ideas such as eco-labelling appliances, only three recommendations made sense economically and ecologically, and that all the rest were ineffective and ruinously expensive, the Royal Society would consider neither MJK's submitted critique, nor another version published in the peer-reviewed literature. A personal appeal to the Society's ruling council also fell on deaf ears. In the face of such unscientific behaviour, resignation was the only option.[14]

To further emphasise this lack of debate, we can point to the last real academic discussion on the topic of global warming. Remarkably, this took place right back in 2014, under the auspices of the American Institute of Physics.[15,16] Prior to the Institute issuing its own statement on climate change, Professor Steve Koonin (the subsequent author of *Unsettled*, a book on the subject of climate and energy policy, the title of which alluded to his own opinion of the underlying science) convened a panel of six experts, three of whom expressed alarm about the changing climate and three of whom were more relaxed in their interpretation of the same data. The transcripts are available and reveal a wide variety of sincere and thoughtful arguments, from both sides, expressed and debated politely over a day. Points of agreement and points of disagreement were clearly identified. In scientific terms it was extremely useful.

Unfortunately, there has been no repetition of such an open scientific discussion between the two sides of the debate anywhere in the world since. On the engineering aspects of Net Zero, and to the best of our knowledge, no such engagement has ever taken place.

5. The IPCC

The Intergovernmental Panel on Climate Change (IPCC), which issues the official assessments of the state of the climate every few years, is an academic institution in all but name, its outputs being largely prepared by academics, based on their reading of the peer-reviewed literature. The exceptions are the summaries of the findings – the Summaries for Policymakers – preparation of which is largely a political activity, with wordsmithing of scientific facts undertaken mostly by government representatives – but with the assistance of some scientists.

Given the pressures and biases already described in this paper, the staffing appears unlikely to lead to an unbiased assessment.

The IPCC reports consist of the output of three working groups. Working Group I looks at the physical science of the changing climate, with the report based partly on observational work about how the climate has changed in the recent and more distant past, but also with several chapters looking forward to how it might change in future. Working Group II looks at the impacts of climate change, and Working Group III looks at possible policy responses. The result of all this is then proclaimed as a scientific consensus.

With the exception of its Summary for Policymakers, the Working Group I report is generally held – at least by open-minded readers – in higher regard than the other parts of the report. The observational sections in particular are nowadays largely suitably sober and caveated. The rest of the report, on the other hand, is generally seen as thoroughly unscientific and even slightly ridiculous, with Working Groups II and III apparently bidding to outdo each other in their attempts to convince readers that we face an imminent global catastrophe.

Being essentially an extension of the academic world, all the biases and pressures that have corrupted the scientific process in universities and in academic journals apply to the IPCC reviews. Take, for example, the IPCC's review process, in which there has been a strong tendency to block or simply wave dissenting views aside. These problems are exemplified by Steve McIntyre, the Canadian statistician who uncovered the flaws in the famous Hockey Stick graph and who has been responsible for undermining the scientific credibility of the whole field of millennial temperature reconstructions.[17] McIntyre described his efforts to get a more balanced treatment of these studies in the IPCC's Fourth Assessment.[18] However, he was frustrated to find that even relatively minor points were simply quashed by the review team. However, he should not have been surprised, as that team consisted of the very same scientists whose work he had been exposing as fatally flawed for years beforehand.

Further biases are introduced by the remit of the IPCC. It was set up, not to study climate and climate change as a whole, but only the human influence upon it. It is hardly surprising that specialists in natural variability barely get a mention. Demetris Koutsoyiannis, one of the leading experts in the area, is not cited at all.

The neglect of natural variability then gets played out in the public realm, with every brief period of bad weather attributed by the less reputable scientists to human influence, and with this 'fairy story' then picked up and amplified by a willing media. The possibility of natural variability having played a role is simply waved aside, with dissenters drowned out by the cacophony of climate alarmists.

Such concerns are only heightened by one of the Climategate emails, in which a climatologist asked his colleagues:

> *What if climate change appears to be just mainly a multidecadal natural fluctuation? They'll kill us probably.*

Behind the scenes then, natural variability was seen as a plausible explanation for recent warming. But that is not the message that the public has been given for the last three decades, so it is hard to disagree with the assessment of how they might react if carbon dioxide turned out to

be only a minor influence.

The fact that these differences of opinion over important scientific questions are kept out of the public realm shows that the stifling of free thought and free speech that has corrupted climate science in the universities has had the same pernicious influence on the IPCC.

Just as natural variability is given a minor role in the assessments, so too is the possibility of adapting to climate change. Instead, the whole focus is on mitigation – in other words, decarbonisation of the economy. This is entirely irrational, since adaptation is generally relatively cheap and, usefully, measures only need to be introduced when there is a proven need for them.[19] The mitigation measures that are currently decimating our economy are predicated on the extremely unlikely eventuality that the climate models are giving us reliable guidance as to how the future will play out.

It is not as though humanity would stand mesmerised in the face of climate impacts and take no action. Sea-level rise – generally accepted to be the most devastating impact of any global warming we might see – is a case in point. The cost of building a wall 68 km long, 5 m high and 1 m thick around the entire harbour of Wellington, New Zealand, at today's sea level, is approximately £150 million. It would protect the city for 300 years or more. Furthermore, the wall would not be needed all at once, but could be built incrementally, adding height to prevent flooding as required. The cost of protecting the whole of the UK from sea-level rise caused by unmitigated warming has been put at around £1 billion per year out to the end of the 21st century.[20]

Contrast these comparatively modest sums with the extraordinary expense and apparent futility of the mitigation measures adopted instead.

A final example of the absurdities that have been accepted by the IPCC without even a caveat or comment is the now notorious emissions scenario commonly referred to as RCP8.5.[21] Emissions scenarios estimate how much carbon dioxide will be emitted in future given different assumptions about, for example, population and economic growth. RCP8.5 assumes, amongst other things, that the world will switch back from relatively cheap natural gas to relatively expensive coal, that population will soar while becoming much richer, and therefore that much more energy will be consumed per capita. Unsurprisingly, this scenario describes very high and rising emissions. As a result, when the numbers are plugged into climate models, the result is warming to catastrophic levels. Because of this, RCP8.5 has become a key tool for climate alarmists. Unfortunately, 'climate alarmists' turns out to be almost all of the scientific research community. Roger Pielke Jr has noted that there are tens of thousands of papers that use the scenario.[22] Worse, most of them describe it as a 'business as usual' scenario, as does the IPCC – fully 50% of all the papers cited in the Working Group II and III reports for the most recent assessment used it as their starting point.

But the assumptions behind RCP8.5 are completely preposterous, undone by the actual world data for the last 30 years, showing a slowing increase in the use of coal, and the fact of a peak in global population in the next 30 years which will arrest the increase even further. The extent of the exaggeration of RCP8.5, and how important it is to the IPCC, has been set out by David Rutledge, an emeritus professor of engineering at Caltech, who observed:[23]

> *In the IPCC's business-as-usual scenario, [RCP8.5], coal accounts for half of future carbon-dioxide emissions through 2100, and two-thirds of the emissions through 2500. The IPCC's coal burn is enormous, twice the world reserves by 2100, and seven times reserves by 2500. Coal so dominates that it is not an exaggeration to say that the IPCC and climate-change research programs depend on this massive coal burn for their existence. Without the threat of coal, the IPCC could close up shop and the research program funding would drop to a small fraction of what is spent on research in weather forecasting.*

That the scenario is entirely implausible has been understood for years. Indeed, right back in 2014, it was sufficiently widely known for the news to have found its way into the popu-

lar press.[24] Yet the IPCC continues to use it as if nothing was wrong, and with almost no word of criticism from mainstream climate scientists.

In other areas of science, such behaviour would be regarded as unprofessional, but in climate science, there is no freedom to say so.

6. The effects on the policy debate

The suppression of debate and criticism in universities, the academies and the IPCC means that the public and policymakers have only ever heard a single message. That message is that climate change is upon us, that floods, droughts and storms (and all the rest of it) are becoming worse, but that by deploying wind and solar power we can eliminate carbon dioxide emissions and undergo an 'energy transition' to a new clean green economy.

None of it is true, but because of the narrative dominance by alarmists, it is little surprise that the UK and other western governments have adopted mitigation – decarbonisation in other words – as the central plank of their responses to the allegedly existential threat of climate change.

Also unsurprisingly, support for these policies has been almost unbroken across the political divide. All of the major parties in Westminster have supported the general direction of travel, and indeed the 2008 Climate Change Act was passed into law with just five MPs voting against.[25] And why wouldn't they do so? They had been told by everyone in science that the costs of not doing so would be catastrophic and that proceeding would be cheap. However – and to repeat ourselves – none of this is true.

Twenty years of following this path has culminated in the target of 'Net Zero 2050', namely a global economy that in twenty-five years' time is no longer adding carbon dioxide to the atmosphere, or alternatively that every tonne of carbon dioxide emitted by mankind in 2050 is collected and sequestered. Notoriously, and reflecting the fact that only one side of the debate is ever heard, the UK adopted the target after only 90 minutes of debate. Even more extraordinarily, MPs viewed it as so uncontroversial that they passed it into law on the nod rather than requiring a formal vote.

The target is astonishingly, presposterously ambitious, may well lead to economic meltdown or a civilisational catastrophe, and yet has been subject to an almost complete lack of meaningful scrutiny or discussion. Indeed, the policy process has been almost entirely infantilised, exhibiting a disturbing unworldliness and an almost complete absence of any engineering rigour. The point bears repeating: nobody who should speak out feels able to do so, fearing career-threatening repercussions if they step out of line.

It is therefore hard to imagine that the political establishment have any idea what they have signed themselves up for. They have not been given real-world estimates of the numbers of windmills required for Net Zero or of what they would cost – the only figures ever produced are based on fantasies about what technological advancement might deliver decades into the future. Similarly, there is almost never any consideration of the number of people needed to make, install and operate them, nor any assessment of how fast could we in practice proceed towards the target, either locally or globally, given the constraints of human, financial and materials resources.

Large and complex projects are usually delivered by a team of committed players, with a detailed plan that all have bought into. The project is led ultimately by someone who takes full and personal responsibility for success or failure. In the UK, two prominent examples of successful major projects are Terminal 5 at Heathrow and the Olympic Park, both delivered on time and within budget by Sir John Armitt, now head of the UK's Infrastructure Commission.

However, as Sir John has noted – and we share his concern – there is no such plan for delivering Net Zero. No one has laid out a detailed pathway in the way, say, that the electronics

industry planned the continuation of Moore's law of progress in computer hardware for 40 years through detailed studies of every part of the IT industry. Their 'International Technology Roadmap for Semiconductors' and its more recent successor have allowed every participant to know what everyone else was striving for, so that the whole was more than the sum of the parts. In contrast, everyone in the Net Zero camp is in pigeonholes, with no reassurance that all the other players are doing their bit, on time and budget.

This has had predicable results – electric vehicles without green electricity to power them, or distribution grids capable of supplying them. We pay windfarms to switch off because the transmission capacity is inadequate to get their output to market. At other times we pay them to switch off because the renewables fleet output exceeds demand, and we have yet to develop a way to store the surplus. If there was a plan worth the name, such problems would have been solved *before* embarking on the so-called 'energy transition'.

The major engineering components of achieving Net Zero include at least three projects of unprecedented scale:

- decarbonising ground transport
- decarbonising industrial, commercial and domestic heat
- expanding the electricity supply to cope with the extra demands for electricity from the first two projects.

MJK has analysed the UK and USA in terms of the extra grid capacity required, and also the costs of retrofitting of buildings to improve energy efficiency, which, alongside electrification, is likely to play an important part in decarbonising them.[26]

In the UK, the expansion of the generation, transmission and distribution of zero-carbon electricity will cost of order £1.4 trillion, require the services of 40,000 professional (electrical and civil) engineers, and at least a three-fold increase in the imports of copper and rare earth metals. Since we have only 38,000 registered professional electrical engineers in the country, we will need to take half of them off what they are doing now and have them work full time on electricity system expansion for 25 years. This is simply not going to happen – the impacts of neglecting existing infrastructure in favour of new grid connections is already causing enormous problems.[27] The politicians and policymakers are spouting nonsense when they ignore this reality. The per-capita figures for the United States are very similar, even though the structure of the electricity use is quite different from the UK.

Retrofitting of buildings to improve the thermal envelope is similarly little more than a pipedream.[4] In an actual experiment,[28] 45 social houses in the UK were subject to a whole-house retrofit, and for an average investment of £85,000 per unit, an average reduction in carbon dioxide emissions of 60% was achieved, well short of the target of 80%.

These figures, scaled up to all 28 million UK houses, and targeting a 100% reduction in emissions, suggest a cost figure in excess of £4 trillion for the nation's housing stock, which might be halved to £2 trillion as the industry learned and became more efficient. However, each house needs a bespoke design to eliminate the last of the emissions, so the latter figure is ambitious. The five million non-residential buildings are typically much larger than homes, and will cost an extra £1 trillion, making the overall cost of the order of £3 trillion.

The per-household costs in the USA from an independent study there agrees with MJK's estimate to within about 10%. The problem is not only the costs, but the need to obtain a workforce comparable in size to the education sector, working full time for 30 years to complete the task. This number of workers, most of them skilled, cannot be conjured up out of nowhere.

The analysis set out in this section suggests that the costs of the Net Zero project will prove insurmountable, and severe economic pain will be inflicted on households. But the whole pro-

ject will be impossible without obtaining public buy-in to:

- the inconveniences caused by the first three projects described above
- a significant change in lifestyles – for the worse – to reduce consumption of energy.

This last point presents a real conundrum: since 1800, quality of life has been closely correlated with access to cheap energy. Wealthy countries use seven or eight times as much energy per person per day as poor ones, and a large fraction of that extra energy use is associated with the personal mobility required for the complex logistics of modern life. Compared with the intense investments in new technologies to drive the four engineering projects, there is little investment in research on living well within a strict energy budget.

The refusal to countenance any rational challenge to Net Zero means that suboptimal investments have been made and continue to be made, in energy infrastructure and elsewhere in the economy. This process has continued for two decades or more and the consequences are becoming clear: the most expensive electricity prices in the world, wholesale deindustrialisation and economic stagnation. The current US Energy Secretary Chris Wright has called Net Zero 'the greatest malinvestment in human history'.[29] The conclusion that the drive for mitigation has been a historic disaster, a catastrophe for our civilisation, is now becoming unavoidable.

Moreover, our self-sacrifice will have been for nothing. China's growth in emissions during 2020–22 was 33 times larger than the savings in emissions in the UK. India's growth was 7 times the UK savings.[30] As a result, atmospheric carbon dioxide levels continue to grow. It is hard to see all our efforts, and our trillions of dollars of spending, as anything other than entirely futile.

The waste of resources may have serious real-world impacts in future. If, as seems likely, we have overspent on mitigation measures, and have only managed to produce an economic train wreck, we are unlikely to have sufficient resources left to deploy adaptation measures in the event that the weather does take a turn for the worse. It doesn't have to be this way. For example, New Zealand has an insurance fund built up over decades to provide the vast sums needed to restore cities after an earthquake. Over £7 billion was available to Christchurch in 2012. We need now to start a climate adaptation fund, perhaps financed by a surcharge on insurance policies.

For decades, anyone who has looked at climate mitigation policy in general, or, more latterly, Net Zero policy, can only have concluded that it was a mad escapade that could only end in failure, and would bring down economic hardship or even catastrophe on any country that attempted it.

That the UK has started out on this road, and continued down it for so long, without any serious discussion of the engineering challenges or of the underlying science represents a complete failure of science and engineering as institutions. Those who should have spoken out in the universities signally failed to do so. Those whose positions of seniority in the academies meant they could have spoken out, refused to do so too.

As the disastrous implications for the economy, for the nation and for our children and grandchildren become clear, fingers will be pointed and questions will be asked of those who were responsible, and those who knew but remained silent. There will inevitably be a day of reckoning for those who brought disaster down on the country.

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The Net Zero and Liberty project

This paper is the first publication in our series *Net Zero and Liberty*, which seeks to explain the dedevelopment of political and economic liberty in the west has been inextricably linked to energy, and how decarbonisation policies threaten to erode many of our hard-won freedoms.

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For further information about Net Zero Watch, please visit our website at www.netzerowatch.com.

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